

# A High Order Accuracy Computational Tool for Unsteady Turbulent Flows and Acoustics, Phase I

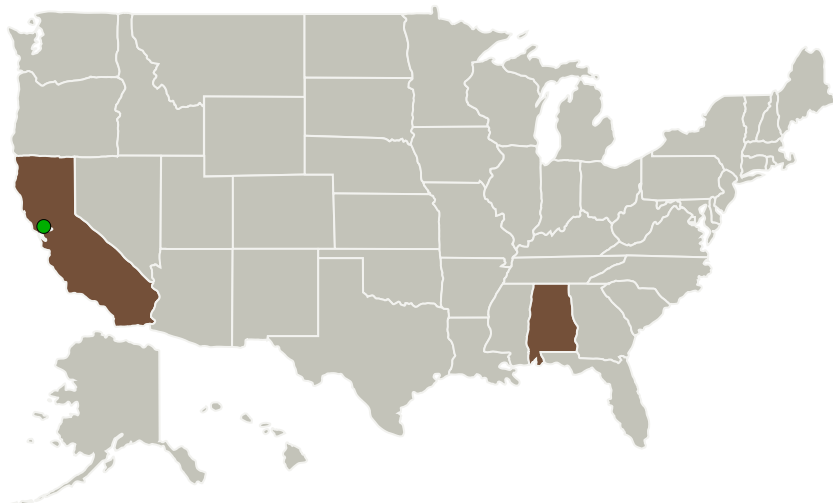
Completed Technology Project (2011 - 2011)



## Project Introduction

The main objective of this research effort is to develop a higher order unsteady turbulent flow solver based on the FDV method, and to exploit its attributes of spanning the whole Mach number range. The well known advantages of the implicit FEM will be inherited along with robust boundary conditions implementation and sound mathematical bases. Efficient parallelization, using MPI through domain decomposition and EBE solution, and supporting unstructured grids will make this effort a long-term investment tool, since all these gained advantages are desirable in virtually every NASA aerodynamics application. To this end, modularization of the in-house developed computer code will be extended to support higher order elements, namely; quadratic, cubic, and eventually spectral elements. The developed higher order code will be tested at various flow conditions starting from the incompressible limit to high supersonics, and including subsonics and transonics.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Frendi Research Corporation	Lead Organization	Industry	Madison, Alabama
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California



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## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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## Primary U.S. Work Locations

Alabama

California

## Project Transitions



**February 2011:** Project Start



**September 2011:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140028>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Frendi Research Corporation

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

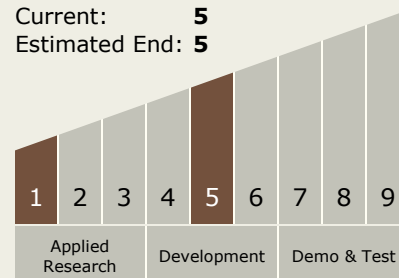
Carlos Torrez

### Principal Investigator:

Kader Frendi

## Technology Maturity (TRL)

Start: **1**  
Current: **5**  
Estimated End: **5**



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## Technology Areas

### Primary:

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.3 Aeroelasticity

## Target Destinations

The Sun, Earth, The Moon,  
Mars, Others Inside the Solar  
System, Outside the Solar  
System